

The claimed invention is:

1. A chemical vapor deposition process for the preparation of a single-wall carbon nanotube, comprising:

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providing methane gas and a supported iron-containing catalyst to a chemical vapor deposition chamber, and

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decomposing the methane in the presence of the supported iron-containing catalyst, under a sufficient gas pressure and for a time sufficient, to grow single-wall carbon nanotubes at a temperature from about 670°C to about 800°C.

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2. A process of claim 1, wherein said temperature is from about 670°C to about 750°C.

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3. A process of claim 1, wherein said temperature is from about 670°C to about 700°C.

4. A process of claim 1, wherein said supported iron-containing catalyst is selected from the group consisting of: $\text{Al}_2\text{O}_3/\text{Fe}/\text{Mo}/\text{Co}$, $\text{Al}_2\text{O}_3/\text{Fe}/\text{Mo}$, $\text{Al}_2\text{O}_3/\text{Fe}/\text{Co}$, $\text{Al}_2\text{O}_3/\text{Fe}$, and mixtures thereof.

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5. A process of claim 4, wherein the supported iron-containing catalyst is $\text{Al}_2\text{O}_3/\text{Fe}/\text{Mo}$ catalyst, and wherein the catalyst has a ratio of $\text{Al}_2\text{O}_3:\text{Fe}:\text{Mo}$ of about (10-20) : 1 : $1/3$.

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6. A process of claim 1, wherein said methane gas is methane or a mixture of methane and a carrier gas.

7. A process of claim 6, wherein said carrier gas is selected from the group consisting of: argon, nitrogen, helium, and mixtures thereof.

8. A process of claim 7, wherein said methane gas and said carrier gas are used in a ratio of about 1:1 by volume to about 1:10 by volume.

9. A chemical vapor deposition process for the preparation of single-wall carbon nanotubes, comprising:

providing methane gas and an $\text{Al}_2\text{O}_3/\text{Fe}/\text{Mo}$ catalyst to a chemical vapor deposition chamber, and

5 decomposing the methane gas in the presence of the $\text{Al}_2\text{O}_3/\text{Fe}/\text{Mo}$ catalyst, under a sufficient gas pressure and for a time sufficient, to grow single-wall carbon nanotubes at a temperature from about 670°C to about 800°C,

10 wherein said single-wall carbon nanotubes have a diameter distribution ranging from about 0.7 nm to about 2.1 nm.

15 10. A process of claim 9, wherein the $\text{Al}_2\text{O}_3/\text{Fe}/\text{Mo}$ catalyst has a ratio of $\text{Al}_2\text{O}_3:\text{Fe}:\text{Mo}$ of about (10-20) : 1 : $\frac{1}{3}$.

11. A process of claim 9, wherein said temperature is from about 670 °C to about 750°C.

12. A process of claim 9, wherein said temperature is from about 670°C to about 700°C.

20 13. A chemical vapor deposition process for the preparation of single-wall carbon nanotubes, comprising:

providing methane gas and an $\text{Al}_2\text{O}_3/\text{Fe}/\text{Co}/\text{Mo}$ catalyst to a chemical vapor deposition chamber, and

25 decomposing the methane gas in the presence of the $\text{Al}_2\text{O}_3/\text{Fe}/\text{Co}/\text{Mo}$ catalyst, under a sufficient gas pressure and for a time sufficient, to grow single-wall carbon nanotubes at a temperature from about 680°C to about 800°C

30 wherein said single-wall carbon nanotubes have a diameter distribution ranging from about 0.7 nm to about 2.1 nm.

14. A process of claim 13, wherein the $\text{Al}_2\text{O}_3/\text{Fe}/\text{Co}/\text{Mo}$ catalyst has a ratio of $\text{Al}_2\text{O}_3:\text{Fe}:\text{Co}:\text{Mo}$ of about (10-20) : 1 : 0.23 : $\frac{1}{6}$.

15. A process of claim 13, wherein the $\text{Al}_2\text{O}_3/\text{Fe}/\text{Co}/\text{Mo}$ catalyst has a ratio of $\text{Al}_2\text{O}_3:\text{Fe}:\text{Co}:\text{Mo}$ of about (10-20) : 1 : 0.23 : $^1/_{18}$.

16. A process of claim 13, wherein the $\text{Al}_2\text{O}_3/\text{Fe}/\text{Co}/\text{Mo}$ catalyst has a ratio of $\text{Al}_2\text{O}_3:\text{Fe}:\text{Co}:\text{Mo}$ of about (10-20) : 1 : 0.23 : $^1/_{36}$.

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17. A process of claim 13, wherein said temperature is from about 680 °C to about 750°C.

18. A process of claim 13, wherein said temperature is from about 680°C to about 700°C.